IN THE CLAIMS:

Please cancel claim 6 without prejudice to or disclaimer of the subject matter contained therein.

Please replace claims 1, 10, 13 and 18 as follows:

1. (Amended) An aluminum-free single crystal seed alloy composition comprising:

nickel; and,

in the proportion of 5 to 50 weight % a further metal selected from the Transition Series of elements in Period VI of the Periodic Table of elements.

10. (Amended) An aluminum-free single crystal seed alloy composition comprising:

nickel; and

in the proportion of 5 to 50 weight % a further metal selected from the Transition Series of elements in Period VI of the Periodic Table of elements,

wherein the alloy composition has a solidification temperature which is not less than 1300°C and not greater than 1400°C, and a solidification temperature range which is not greater than 20°C.

13. (Amended) An aluminum-free single crystal seed alloy composition consisting essentially of:

nickel; and,

tantalum in the proportion of 13 to 45 weight %,

wherein the alloy composition has a solidification temperature which is not less than 1300°C and not greater than 1400°C, and a solidification temperature range which is not greater than 20°C.

18. (Amended) An aluminum-free single crystal seed alloy composition consisting essentially of:

nickel; and

tantalum in the proportion of 25 to 35 weight %,

wherein the alloy composition has a solidification temperature which is not less than 1300°C and not greater than 1400°C, and a solidification temperature range which is not greater than 20°C.

Please add new claims 19 and 20 as follows:

--19. (New) An aluminum-free single crystal seed alloy composition consisting essentially of:

nickel; and

tungsten in the proportion of 5 to 50 weight %.--

--20. (New) An aluminum-free single crystal seed alloy composition consisting essentially of:

nickel; and

tungsten in the proportion of 13 to 40 weight %.--

REMARKS

Claims 1-5 and 7-18 are pending. By the Office Action claims 14-17 are rejected under 35 U.S.C. §112, second paragraph; claims 12 and 13 are rejected under 35 U.S.C. §101; claims 1-11 and 14 are rejected under 35 U.S.C. §102; and claims 12, 13 and 15-18 are rejected under 35 U.S.C. §103. By this Amendment, the specification and claims 1, 10, 13 and 18 are amended; claim 6 is canceled; and claims 19-20 are added. No new matter is added. In view of the foregoing amendments and the following remarks, reconsideration and allowance are respectfully requested.

The attached Appendix includes marked-up copies of each rewritten paragraph (37 C.F.R. §1.121(b)(1)(iii)) and claim (37 C.F.R. §1.121(c)(1)(ii)).

I. Rejection under §112

The Office Action rejects claims 14-17 under 35 U.S.C. §112, second paragraph. The Office Action alleges that claim 14 does not provide proper antecedent basis for the element "the further metal in claim 1." The Office Action also states that tantalum is not a Period VI element. Applicants respectfully traverse this rejection.

Claim 14 depends from claim 1. The Office Action correctly identifies that "the further metal" in claim 14 refers to "a further metal selected from the Transition Series of elements in Period VI of the Periodic Table of elements" recited in claim 1. However, the Office Action is incorrect in its understanding of tantalum. Tantalum is indeed a Period VI element in the Transition Series. Period VI (or Period 6) of the Transition Series consists of hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold and mercury. The designation "Period VI of the Transition Series" is equivalent to the more conventional term "Third Transition Series." This series of elements are shown in the attached hand-marked copy of the Periodic Table, excerpted from "Advanced Inorganic Chemistry" (Cotton & Wilkinson, Pub. John Wiley & Sons, Fourth Edition, 1980). Thus, "the further metal" element in claim 14 has proper antecedent support from "a further metal" recited in claim 1. Being familiar with the Periodic Table, one of ordinary skill in the art would consider the language of claim 14 as definite.

Accordingly, claim 14 satisfies the requirements of 35 U.S.C. §112, second paragraph. Depending from claim 14, claims 15-17 also satisfy the requirements of 35 U.S.C. §112, second paragraph. Applicants respectfully request reconsideration and withdrawal of the rejection.

If preferred by the Examiner, Applicants would accept amending for clarity the phrase in claim 1 "Transition Series of elements in Period VI of the Periodic Table of elements" to "Period 6 of the Transition Series" or "Third Transition Series."

II. Rejection under §101

The Office Action rejects claims 12 and 13 under 35 U.S.C. §101. The Office Action states that the nickel-tungsten binary alloy of claims 12 and 13 could not have the claimed "solidification temperature of not less than 1300°C and not more than 1400°C" and consequently, such alloys would not exist. Applicants respectfully traverse this rejection.

Initially, Applicants note that only instant claim 13 contains the solidification temperature range feature in question. Claim 12 depends from claim 11, which further depends from claim 1, and is drawn to a seed alloy composition including nickel and 13 to 40% tungsten. Claim 12 does not recite a solidification temperature range. For this reason alone, the rejection of claim 12 should be withdrawn.

Amended claim 13 is drawn to an alloy composition consisting essentially of nickel and 13 to 45 % tantalum. Such an alloy could have the claimed "solidification temperature which is not less than 1300°C and not greater than 1400°C". Support for amended claim 13 can be found in the specification at least at page 3, lines 19-26, and page 4, lines 18-29. The alloy of claim 13 could exist and has a real and substantial use. Accordingly, claim 13 satisfies the requirements of 35 U.S.C.§101.

Applicants respectfully request reconsideration and withdrawal of the rejection.

III. Rejection under §102

The Office Action rejects claims 1, 3-7, 11 and 14 under 35 U.S.C. §102(b) over U.S. Patent No. 4,900,394 to Mankins ("Mankins"), and rejects claims 2 and 8-10 under 35 U.S.C. §102(b) over Mankins in view of ASM Handbook, Volume 3 ("ASM"). Applicants respectfully traverse the rejections.

A. Claims 1, 3-7, 11 and 14

The Office Action asserts that Mankins describes a nickel-base single crystal seed alloy containing up to 26 wt% chromium. The Office Action further asserts that since chromium is from the Period VI of the periodic table of the elements, Mankins anticipates the claimed composition. However, as detailed above, there is a distinction between "Period VI" and "Group VI." Period VI elements of the transition series are limited to hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold and mercury. Since chromium is not a Period VI element, it does not fit the definition of the "further metal".

Mankins describes a process for producing a single crystal object in which a single nickel-based alloy seed is fusion welded to a closely matching polycrystalline nickel-based alloy object. The weld interface between the single crystal seed and the polycrystalline object is annealed to cause the crystal structure of the object to change from polycrystalline to single crystal. The annealing zone is then moved along the body to grow the single crystal in the body. Mankins appears to be concerned with process details, and does not describe any particular alloy, much less any particular alloy within the terms of the present claims.

The passage at column 2, lines 55 to 60 and Table I of Mankins states that the nickel-base alloys "generally have compositions which fall within the limits of one or more of the alloying ingredient ranges as set forth in Table I" (emphasis added). Therefore, the disclosure is not clearly directed to alloy compositions comprising nickel and a Period VI transition metal. Such possibilities (i.e., Ni + W, Ni + Ta, Ni + Hf, Ni + Re) are only a few out of many permutations of the Table I options, most of which fall outside the scope of the present claims. Of the Period VI transition metals listed in Table I, only tantalum is shown in a preferred range extending above 5 weight percent, and then only to 6 weight percent. Overwhelmingly, any use of a Period VI transition metal would be at less than 5 weight percent, if at all.

Table II of Mankins is in similar terms, except that here the preferred tungsten level also extends up to 6 weight percent, rather than 5 weight percent. As with Table I, there is no clear disclosure of the alloys of the present invention.

Mankins arguably at most describes a vague, insignificant and exceptionally minor overlap between the extreme top edges of a very few of the potential options in Tables I and II and the claimed crystal seed alloy. Moreover, where any overlap theoretically could occur goes entirely against the purpose and preferences of Mankin's core teachings.

Amended claims 1-5, 7-18, and new claims 19-20, are drawn to aluminum-free single crystal seed alloy compositions. Mankin does not disclose, nor does it teach or suggest, the claimed aluminum-free single crystal seed alloy composition. Applicants have canceled claim 6, thus rendering moot the rejection of claim 6.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

B. Claims 2 and 8-10

The Office Action states that the features of claim 2, specifically, a solidification temperature between 1300 and 1400°C, would be inherent in the claimed alloy, specifically a nickel-chromium binary alloy. The Office Action further states that the features of claims 8 and 9, namely a solidification temperature range of not greater than 20°C, would also be inherent. The Office Action points to the nickel-chromium phase diagram in ASM, at page 155, for support.

As detailed above, the Office Action's reliance on nickel-chromium alloys is misguided. Applicants claim nickel based alloys containing metals selected from the Transition Series of elements in Period VI. Chromium is not a Period VI element. Thus, the properties of a nickel-chromium alloy, inherent or otherwise, are irrelevant to the patentability of claims to alloys of the instant application.

For at least this reason, plus the fact that Mankin does not disclose, teach or suggest the claimed aluminum-free single crystal seed alloy composition, Mankin in view of ASM does not anticipate claims 2 and 8-10. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

IV. Rejection under §103

A. Claims 12 and 13

The Office Action rejects claim 12 under 35 U.S.C. §103(a) over Mankins in view of U.S. Patent No. 4,707,192 to Yamazaki ("Yamazaki"), and rejects claim 13 over Mankins in view of Yamazaki, and further in view of ASM. Applicants respectfully traverse these rejections.

The Office Action acknowledges that Mankins does not teach an alloy of claim 12 with greater than 12 wt% tungsten, but asserts that Yamazaki teaches nickel single-crystal alloys with 7.5 to 20 wt% tungsten having strengthened gamma and gamma prime phases. The Office Action also acknowledges that Mankins does not teach an alloy with the solidification point and temperature ranges of claim 13, but asserts that such features could not be achieved for a nickel-tungsten alloy, as shown in ASM.

Amended claims 12 and 13 incorporate a feature from claim 6, specifically an aluminum-free alloy composition, that is nowhere taught or suggested in Yamazaki. In fact, the single crystal nickel-based composition disclosed in Yamazaki contains a substantial amount of aluminum (see, Abstract). There is no suggestion in Yamazaki, or ASM, to exclude aluminum from the composition. Moreover, Yamazaki teaches away from an aluminum-free alloy composition. Yamazaki discloses, at column 4, lines 7-10, that aluminum "is an element essential to the formation of the gamma prime phase, and in order to precipitate the gamma prime phase, it should be included in an amount of at least 4.5%."

The combined teachings of Mankins, Yamazaki and ASM, would not have rendered obvious the alloy composition of claims 12 and 13.

Applicants respectfully request reconsideration and withdrawal of the rejection.

B. Claims 15-17 and 18

The Office Action rejects claim 15-17 under 35 U.S.C. §103(a) over Mankins in view of U.S. Patent No. 4,764,225 to Shankar et al. ("Shankar), and rejects claim 18 over Mankins in view of Shankar, and further in view of ASM. Applicants respectfully traverse these rejections.

The Office Action acknowledges that Mankins does not teach the addition of tantalum in amounts greater than 8 wt%, but asserts that Shankar teaches the addition of up to 30 wt% of tantalum for improving the resistance to elevated temperature deformation. The Office Action also acknowledges that Mankins does not teach an alloy with the solidification point and temperature ranges of claim 18, but asserts that one of ordinary skill in the art would have expected such features to be inherent. The Office Action points to the nickel-tantalum binary phase diagram in ASM, at page 319, for support.

As detailed above regarding the rejection of claims 12 and 13, amended claims 15-18 incorporate a feature from claim 6, specifically an aluminum-free alloy composition, that is nowhere taught or suggested in Shankar. In fact, the single crystal nickel-based composition disclosed in Shankar contains a substantial amount of aluminum (see, Abstract). Moreover, there is no suggestion in Shankar, or ASM, to exclude aluminum from the composition. Shankar discloses, at column 4, lines 17-21, that the addition of aluminum to the alloy provides "oxidation resistance in high temperature environments." Shankar further states, at column 4, lines 25-27 that "[I]t is well known to those skilled in the art that aluminum, tungsten, ...serve as strong solid-solution strengtheners ..." The combined teachings of